MESOZOIC INSECTS OF QUEENSLAND.

No. 10. SUMMARY OF THE UPPER TRIASSIC INSECT FAUNA OF IPSWICH, Q. (With an Appendix describing new Hemiptera and Planipennia).

By R. J. TILLYARD, M.A., Sc.D. (Cantab.), D.Sc. (Sydney), C.M.Z.S., F.L.S., F.E.S., Entomologist and Chief of the Biological Department, Cawthron Institute, Nelson, N.Z.

(Plate xliii., figs. 38-40; Text-figs. 90-93.)

[Read 31st October, 1923.]

With the addition of a few forms dealt with as an Appendix to this paper, the publication of Mr. Dunstan's work on the Coleoptera (1923) brings to a close the work on the extensive collections of Upper Triassic fossil insects found at Denmark Hill, Ipswich, Q. We are, therefore, now in a position to summarize these results, and to draw conclusions from them as to the age of the beds and the composition of the fauna disclosed in them. With this end in view, I propose to give, first of all, a complete list of the Orders, families, genera and species described from Ipswich, and then to discuss the results. The list here given differs slightly from the detailed results as published in the various parts, as follows:—

(1). After further study of the Order Protodonata, I am unable to admit the retention of the genus *Aeroplana* in this Order. This type of wing appears to be a highly specialised offshoot from the old Palaeodictyoptera, showing some affinities with the Protorthoptera on account of the structure of the much simplified radial sector and the many-branched media. I propose, therefore, to treat the Aeroplanoptera as a distinct Order rather than as a Suborder of the Protodonata.

(2). Two new species of *Triassocoris* and a new genus and species belonging to the Order Neuroptera-Planipennia are described in the Appendix to this paper, and are included in the list, bringing the total number of species up to 122, belonging to 63 genera, 32 families, and 10 Orders, as shown in the following list. Genotype species are marked with an asterisk. For references, *see* bibliography at end of this paper.

List of Fossil Insects from the Upper Triassic Beds of Denmark Hill, Ispwich, Q.

Order AEROPLANOPTERA.

Family Aeroplanidae.
    Genus AEROPLANA Till., 1918*b*, p. 426.
        **Aeroplana mirabilis* Till., 1918*b*, p. 426.

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List of Fossil Insects from the Upper Triassic Beds of Denmark Hill, Ispwich, Q.

Order Aeroplanoptera.

Family Aeroplanidae.
  Genus Aeroplana Till., 1918*b*, p. 426.
    **Aeroplana mirabilis* Till., 1918*b*, p. 426.

Order ODONATA.
Sub-order *Archizygoptera.*

Family Triassagrionidae.
Genus TRIASSAGRION Till., 1922, p. 455.
**Triassagrion australiense* Till., 1922, p. 456.

Sub-order *Anisozygoptera.*

Family Mesophlebiidae.
Genus MESOPHLEBIA Till., 1916, p. 24; 1922, p. 452.
**Mesophlebia antinodalis* Till., 1916, p. 25; 1922, p. 452.
Genus TRIASSOPHLEBIA Till., 1922, p. 454.
**Triassophlebia stigmatica* Till., 1922, p. 454.
Family Triassolestidae.
Genus TRIASSOLESTES Till., 1918*b*, p. 418.
**Triassolestes epiophlebioides* Till., 1918*b*, p. 419.
Incertae sedis.
Genus PERISSOPHLEBIA Till., 1918*b*, p. 422.
**Perissophlebia multiseriata* Till., 1918*b*, p. 424.

Order PROTORTHOPTERA.

Family Mesorthopteridae.
Genus MESORTHOPTERON Till., 1916, p. 14; 1922, p. 448.
**Mesorthopteron locustoides* Till., 1916, p. 14; 1922, p. 448.
Family Mesomantidiidae.
Genus MESOMANTIDION Till., 1916, p. 16.
**Mesomantidion queenslandicum* Till., 1916, p. 16.

Order ORTHOPTERA.
Sub-order *Blattoidea.*

Family Mylacridae.
Genus AUSTROMYLACRITES Till., 1916, p. 13.
**Austromylacrites latus* Till., 1916, p. 13.
Family Mesoblattinidae.
Genus TRIASSOBLATTA Till., 1919*b*, p. 367.
**Triassoblatta typica* Till., 1919*b*, p. 368.
Triassoblatta insignita Till., 1919*b*, p. 370.
Triassoblatta (?) *intermedia* Till., 1919*b*, p. 371.
Genus SAMAROBLATTA Till., 1919*b*, p. 373.
**Samaroblatta reticulata* Till., 1919*b*, p. 374.
Samaroblatta triassica Till., 1919*b*, p. 375.
Samaroblatta jonesi Till., 1919*b*, p. 376.
Samaroblatta blattelloides Till., 1919*b*, p. 377.
Samaroblatta intercalata Till., 1919*b*, p. 379.
Genus AUSTROBLATTULA Till., 1919*b*, p. 380.
**Austroblattula ipsviciensis* Till., 1919*b*, p. 381.

Sub-order *Mantoidea.*

Family Triassomantidae.
Genus TRIASSOMANTIS Till., 1922, p. 450.
**Triassomantis pygmaeus* Till., 1922, p. 450.

Order ODONATA.

Sub-order *Archizygoptera.*

Family Triassagrionidae.

Genus TRIASSAGRION Till., 1922, p. 455.

**Triassagrion australiense* Till., 1922, p. 456.

Sub-order *Anisozygoptera.*

Family Mesophlebiidae.

Genus MESOPHLEBIA Till., 1916, p. 24; 1922, p. 452.

**Mesophlebia antinodalis* Till., 1916, p. 25; 1922, p. 452.

Genus TRIASSOPHLEBIA Till., 1922, p. 454.

**Triassophlebia stigmatica* Till., 1922, p. 454.

Family Triassolestidae.

Genus TRIASSOLESTES Till., 1918*b*, p. 418.

**Triassolestes epiophlebioides* Till., 1918*b*, p. 419.

Incertae sedis.

Genus PERISSOPHLEBIA Till., 1918*b*, p. 422.

**Perissophlebia multiseriata* Till., 1918*b*, p. 424.

Order PROTORTHOPTERA.

Family Mesorthopteridae.

Genus MESORTHOPTERON Till., 1916, p. 14; 1922, p. 448.

**Mesorthopteron locustoides* Till., 1916, p. 14; 1922, p. 448.

Family Mesomantidiidae.

Genus MESOMANTIDION Till., 1916, p. 16.

**Mesomantidion queenslandicum* Till., 1916, p. 16.

Order ORTHOPTERA.

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**Triassoblatta typica* Till., 1919*b*, p. 368.

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Genus SAMAROBLATTA Till., 1919*b*, p. 373.

**Samaroblatta reticulata* Till., 1919*b*, p. 374.

Samaroblatta triassica Till., 1919*b*, p. 375.

Samaroblatta jonesi Till., 1919*b*, p. 376.

Samaroblatta blattelloides Till., 1919*b*, p. 377.

Samaroblatta intercalata Till., 1919*b*, p. 379.

Genus AUSTROBLATTULA Till., 1919*b*, p. 380.

**Austroblattula ipsviciensis* Till., 1919*b*, p. 381.

Sub-order *Mantoidea.*

Family Triassomantidae.

Genus TRIASSOMANTIS Till., 1922, p. 450.

**Triassomantis pygmaeus* Till., 1922, p. 450.

Sub-order *Locustoidea.*

Family Locustopsidae.

Genus TRIASSOLOCUSTA Till., 1922, p. 451.

**Triassolocusta leptoptera* Till., 1922, p. 451.

Order HEMIPTERA.

Sub-order *Homoptera.*

Family Mesogereonidae.

Genus MESOGEREON Till., 1916, p. 33; 1921, p. 273.

**Mesogereon neuropunctatum* Till., 1916, p. 34; 1921, p. 273.

Mesogereon superbum Till., 1921, p. 274.

Mesogereon compressum Till., 1921, p. 277.

Mesogereon affine Till., 1921, p. 277.

Mesogereon shepherdi Till., 1921, p. 279.

Family Cicadellidae.

Genus MESOJASSUS Till., 1916, p. 34; 1920, p. 885.

**Mesojassus ipsviciensis* Till., 1916, p. 35; 1920, p. 886.

Genus EURYMELIDIUM Till., 1920, p. 884.

**Eurymelidium australe* Till., 1920, p. 885.

Genus TRIASSOJASSUS Till., 1920, p. 887.

**Triassojassus proavitus* Till., 1920, p. 888.

Family Scytinopteridae.

Genus MESOSCYTINA Till., 1920, p. 871.

**Mesoscytina australis* Till., 1920, p. 871.

Mesoscytina affinis Till., 1920, p. 872.

Genus TRIASSOSCARTA Till., 1920, p. 874.

**Triassoscarta subcostalis* Till., 1920, p. 874.

Genus APHELOSCYTA Till., 1922, p. 458.

**Apheloscyta mesocampta* Till., 1922, p. 459.

Genus CHILIOCYCLA Till., 1920, p. 868; 1922, p. 460.

**Chiliocycla scolopoides* Till., 1920, p. 869; 1922, p. 460.

Genus POLYCYTELLA Till., 1922, p. 460.

**Polycytella triassica* Till., 1922, p. 460.

Family Tropiduchidae.

Genus MESODIPHTHERA Till., 1920, p. 873; 1922, p. 461.

**Mesodiphthera grandis* Till., 1920, p. 873.

Mesodiphthera prosboloides Till., 1922, p. 461.

Mesodiphthera dunstani Till., 1922, p. 462.

Family Cixiidae.

Genus MESOCIXIUS Till., 1920, p. 876.

**Mesocixius triassicus* Till., 1920, p. 877.

Genus TRIASSOCIXIUS Till., 1920, p. 878.

**Triassocixius australicus* Till., 1920, p. 878.

Genus MESOCIXIODES Till., 1922, p. 462.

**Mesocixiodes termioneura* Till., 1922, p. 462.

Mesocixiodes orthoclada Till., 1922, p. 463.

Mesocixiodes brachyclada Till., 1922, p. 463.

Family Ipsviciidae.

Genus IPSVICIA Till., 1920, p. 878.

**Ipsvicia jonesi* Till., 1920, p. 879.

Ipsvicia maculata Till., 1920, p. 881.

Sub-order *Locustoidea.*

Family Locustopsidae.
Genus TRIASSOLOCUSTA Till., 1922, p. 451.
**Triassolocusta leptoptera* Till., 1922, p. 451.

Order HEMIPTERA.
Sub-order *Homoptera.*

Family Mesogereonidae.
Genus MESOGEREON Till., 1916, p. 33; 1921, p. 273.
**Mesogereon neuropunctatum* Till., 1916, p. 34; 1921, p. 273.
Mesogereon superbum Till., 1921, p. 274.
Mesogereon compressum Till., 1921, p. 277.
Mesogereon affine Till., 1921, p. 277.
Mesogereon shepherdi Till., 1921, p. 279.

Family Cicadellidae.
Genus MESOJASSUS Till., 1916, p. 34; 1920, p. 885.
**Mesojassus ipsviciensis* Till., 1916, p. 35; 1920, p. 886.
Genus EURYMELIDIUM Till., 1920, p. 884.
**Eurymelidium australe* Till., 1920, p. 885.
Genus TRIASSOJASSUS Till., 1920, p. 887.
**Triassojassus proavitus* Till., 1920, p. 888.

Family Scytinopteridae.
Genus MESOSCYTINA Till., 1920, p. 871.
**Mesoscytina australis* Till., 1920, p. 871.
Mesoscytina affinis Till., 1920, p. 872.
Genus TRIASSOSCARTA Till., 1920, p. 874.
**Triassoscarta subcostalis* Till., 1920, p. 874.
Genus APHELOSCYTA Till., 1922, p. 458.
**Apheloscyta mesocampta* Till., 1922, p. 459.
Genus CHILIOCYCLA Till., 1920, p. 868; 1922, p. 460.
**Chiliocycla scolopoides* Till., 1920, p. 869; 1922, p. 460.
Genus POLYCYTELLA Till., 1922, p. 460.
**Polycytella triassica* Till., 1922, p. 460.

Family Tropiduchidae.
Genus MESODIPHTHERA Till., 1920, p. 873; 1922, p. 461.
**Mesodiphthera grandis* Till., 1920, p. 873.
Mesodiphthera prosboloides Till., 1922, p. 461.
Mesodiphthera dunstani Till., 1922, p. 462.

Family Cixiidae.
Genus MESOCIXIUS Till., 1920, p. 876.
**Mesocixius triassicus* Till., 1920, p. 877.
Genus TRIASSOCIXIUS Till., 1920, p. 878.
**Triassocixius australicus* Till., 1920, p. 878.
Genus MESOCIXIODES Till., 1922, p. 462.
**Mesocixiodes termioneura* Till., 1922, p. 462.
Mesocixiodes orthoclada Till., 1922, p. 463.
Mesocixiodes brachyclada Till., 1922, p. 463.

Family Ipsviciidae.
Genus IPSVICIA Till., 1920, p. 878.
**Ipsvicia jonesi* Till., 1920, p. 879.
Ipsvicia maculata Till., 1920, p. 881.

Ipsvicia acutipennis Till., 1920, p. 883.
Genus IPSVICIOPSIS Till., 1922, p. 464.
**Ipsviciopsis elegans* Till., 1922, p. 464.
Ipsviciopsis magna Till., 1922, p. 465.

Sub-order *Heteroptera.*

Family Dunstaniidae.
Genus DUNSTANIA Till., 1916, p. 31; 1918*c*, p. 583.
**Dunstania pulchra* Till., 1916, p. 32; 1918*c*, plate.
Genus DUNSTANIOPSIS Till., 1918*c*, p. 584.
**Dunstaniopsis triassica* Till., 1918*c*, p. 585.
Genus PARADUNSTANIA Till., 1918*c*, p. 585.
**Paradunstania affinis* Till., 1918*c*, p. 586.
Family Triassocoridae.
Genus TRIASSOCORIS Till., 1922, p. 466.
**Triassocoris myersi* Till., 1922, p. 466.
Triassocoris scutulum Till., 1922, p. 467.
Triassocoris ovalis n.sp.
Triassocoris (?) *grandis* n.sp.

Order PROTOMECOPTERA

Family Archipanorpidae.
Genus ARCHIPANORPA Till., 1917, p. 191.
**Archipanorpa magnifica* Till., 1917, p. 191.

Order MECOPTERA.

Family Choristidae.
Genus MESOCHORISTA Till., 1916, p. 29.
**Mesochorista proavita* Till., 1916, p. 30.
Family Stereochoristidae.
Genus STEREOCHORISTA Till., 1919*a*, p. 196.
**Stereochorista frustrata* Till., 1919*a*, p. 197.

Order PARATRICHOPTERA.

Family Mesopsychidae.
Genus MESOPSYCHE Till., 1917, p. 181.
**Mesopsyche triareolata* Till., 1917, p. 182.
Genus TRIASSOPSYCHE Till., 1917, p. 182.
**Triassopsyche dunstani* Till., 1917, p. 184.
Genus ARISTOPSYCHE Till., 1919*a*, p. 200.
**Aristopsyche superba* Till., 1919*a*, p. 202.
Genus NEUROPSYCHE Till., 1919*a*, p. 203.
**Neuropsyche elongata* Till., 1919*a*, p. 204.

Order NEUROPTERA.
Sub-order *Planipennia.*

Family Prohemerobiidae.
Genus PROTOPYSCHOPSIS Till., 1917, p. 178.
**Protopsychopsis venosa* Till., 1917, p. 180.
Genus OSMYLOPSYCHOPS, n.g.
**Osmylopsychops spillerae,* n.sp.
Family Psychopsidae.
Genus ARCHEPSYCHOPS Till., 1919*a*, p. 205.

Ipsvicia acutipennis Till., 1920, p. 883.
Genus IPSVICIOPSIS Till., 1922, p. 464.
**Ipsviciopsis elegans* Till., 1922, p. 464.
Ipsviciopsis magna Till., 1922, p. 465.

Sub-order *Heteroptera*.

Family Dunstaniidae.
Genus DUNSTANIA Till., 1916, p. 31; 1918*c*, p. 583.
**Dunstania pulchra* Till., 1916, p. 32; 1918*c*, plate.
Genus DUNSTANIOPSIS Till., 1918*c*, p. 584.
**Dunstaniopsis triassica* Till., 1918*c*, p. 585.
Genus PARADUNSTANIA Till., 1918*c*, p. 585.
**Paradunstania affinis* Till., 1918*c*, p. 586.
Family Triassocoridae.
Genus TRIASSOCORIS Till., 1922, p. 466.
**Triassocoris myersi* Till., 1922, p. 466.
Triassocoris scutulum Till., 1922, p. 467.
Triassocoris ovalis n.sp.
Triassocoris (?) *grandis* n.sp.

Order PROTOMECOPTERA

Family Archipanorpidae.
Genus ARCHIPANORPA Till., 1917, p. 191.
**Archipanorpa magnifica* Till., 1917, p. 191.

Order MECOPTERA.

Family Choristidae.
Genus MESOCHORISTA Till., 1916, p. 29.
**Mesochorista proavita* Till., 1916, p. 30.
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Genus STEREOCHORISTA Till., 1919*a*, p. 196.
**Stereochorista frustrata* Till., 1919*a*, p. 197.

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**Mesopsyche triareolata* Till., 1917, p. 182.
Genus TRIASSOPSYCHE Till., 1917, p. 182.
**Triassopsyche dunstani* Till., 1917, p. 184.
Genus ARISTOPSYCHE Till., 1919*a*, p. 200.
**Aristopsyche superba* Till., 1919*a*, p. 202.
Genus NEUROPSYCHE Till., 1919*a*, p. 203.
**Neuropsyche elongata* Till., 1919*a*, p. 204.

Order NEUROPTERA.
Sub-order *Planipennia*.

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**Protopsychopsis venosa* Till., 1917, p. 180.
Genus OSMYLOPSYCHOPS, n.g.
**Osmylopsychops spillerae*, n.sp.
Family Psychopsidae.
Genus ARCHEPSYCHOPS Till., 1919*a*, p. 205.

**Archepsychops triassica* Till., 1919*a*, p. 206.
Genus TRIASSOPSYCHOPS Till., 1922, p. 467.
**Triassopsychops superba* Till., 1922, p. 469.

Order COLEOPTERA.

Family Hydrophilidae.
Genus ADEMOSYNE Handl., 1906, p. 402.
**Ademosyne major* Handl., 1906, p. 402; Till., 1916, p. 19; Dunst., 1923, p. 15.
Ademosyne olliffi (Handl.), 1906, p. 402; Till., 1916, p. 19; Dunst., 1923, p. 12.
Ademosyne australiensis Till., 1916, p. 18; Dunst., 1923, p. 19.
Ademosyne congener Till., 1916, p. 20; Dunst., 1923, p. 22.
Ademosyne cameroni Till., 1916, p. 21; Dunst., 1923, p. 24.
Ademosyne punctata Till., 1916, p. 21; Dunst., 1923, p. 23.
Ademosyne parva Dunst., 1923, p. 13.
Ademosyne intermedia Dunst., 1923, p. 14.
Ademosyne lata Dunst., 1923, p. 15.
Ademosyne brevis Dunst., 1923, p. 17.
Ademosyne curvata Dunst., 1923, p. 18.
Ademosyne ramocostata Dunst., 1923, p. 19.
Ademosyne rugulosa Dunst., 1923, p. 20.
Ademosyne vittamargina Dunst., 1923, p. 21.
Ademosyne adunca Dunst., 1923, p. 23.
Genus ADEMOSYNOIDES Dunstan, 1923, p. 25.
**Ademosynoides minor* (Handl.), 1906, p. 403; Till., 1916, p. 20; Dunst., 1923, p. 26.
Ademosynoides obtusa (Till.), 1916, p. 19; Dunst., 1923, p. 26.
Ademosynoides angusta (Till.), 1916, p. 18; Dunst., 1923, p. 29.
Ademosynoides alternata Dunst., 1923, p. 27.
Ademosynoides striatella Dunst., 1923, p. 28.
Ademosynoides abnormis Dunst., 1923, p. 30.
Ademosynoides magnifica Dunst., 1923, p. 31.
Genus PLATYCROSSOS Dunstan, 1923, p. 32.
**Platycrossos tumidus* (Till.), 1916, p. 21; Dunst., 1923, p. 34.
Platycrossos ligulatus Dunst., 1923, p. 33.
Platycrossos subtumidus Dunst., 1923, p. 34.
Genus SIMMONDSIA Dunstan, 1923, p. 35.
**Simmondsia subpyriformis* Dunst., 1923, p. 36.
Simmondsia cylindrica Dunst., 1923, p. 37.
Genus GRAMMOSITUS Dunstan, 1923, p. 37.
**Grammositus bilineatus* Dunst., p. 38.
Genus SHEPHERDIA Dunstan, 1923, p. 38.
**Shepherdia quadrivittata* Dunst., 1923, p. 39.
Genus POLYSITUS Dunstan, 1923, p. 40.
**Polysitus punctatus* Dunst., 1923, p. 40.
Polysitus minutus Dunst., 1923, p. 42.

Family Tenebrionidae (?).
Genus ULOMITES Till., 1916, p. 22.
**Ulomites willcoxi* Till., 1916, p. 22; Dunst., 1923, p. 43.

**Archepsychops triassica* Till., 1919*a*, p. 206.

Genus Triassopsychops Till., 1922, p. 467.

**Triassopsychops superba* Till., 1922, p. 469.

Order Coleoptera.

Family Hydrophilidae.

Genus Ademosyne Handl., 1906, p. 402.

**Ademosyne major* Handl., 1906, p. 402; Till., 1916, p. 19; Dunst., 1923, p. 15.

Ademosyne olliffi (Handl.), 1906, p. 402; Till., 1916, p. 19; Dunst., 1923, p. 12.

Ademosyne australiensis Till., 1916, p. 18; Dunst., 1923, p. 19.

Ademosyne congener Till., 1916, p. 20; Dunst., 1923, p. 22.

Ademosyne cameroni Till., 1916, p. 21; Dunst., 1923, p. 24.

Ademosyne punctata Till., 1916, p. 21; Dunst., 1923, p. 23.

Ademosyne parva Dunst., 1923, p. 13.

Ademosyne intermedia Dunst., 1923, p. 14.

Ademosyne lata Dunst., 1923, p. 15.

Ademosyne brevis Dunst., 1923, p. 17.

Ademosyne curvata Dunst., 1923, p. 18.

Ademosyne ramocostata Dunst., 1923, p. 19.

Ademosyne rugulosa Dunst., 1923, p. 20.

Ademosyne vittamargina Dunst., 1923, p. 21.

Ademosyne adunca Dunst., 1923, p. 23.

Genus Ademosynoides Dunstan, 1923, p. 25.

**Ademosynoides minor* (Handl.), 1906, p. 403; Till., 1916, p. 20; Dunst., 1923, p. 26.

Ademosynoides obtusa (Till.), 1916, p. 19; Dunst., 1923, p. 26.

Ademosynoides angusta (Till.), 1916, p. 18; Dunst., 1923, p. 29.

Ademosynoides alternata Dunst., 1923, p. 27.

Ademosynoides striatella Dunst., 1923, p. 28.

Ademosynoides abnormis Dunst., 1923, p. 30.

Ademosynoides magnifica Dunst., 1923, p. 31.

Genus Platycrossos Dunstan, 1923, p. 32.

**Platycrossos tumidus* (Till.), 1916, p. 21; Dunst., 1923, p. 34.

Platycrossos ligulatus Dunst., 1923, p. 33.

Platycrossos subtumidus Dunst., 1923, p. 34.

Genus Simmondsia Dunstan, 1923, p. 35.

**Simmondsia subpyriformis* Dunst., 1923, p. 36.

Simmondsia cylindrica Dunst., 1923, p. 37.

Genus Grammositus Dunstan, 1923, p. 37.

**Grammositus bilineatus* Dunst., p. 38.

Genus Shepherdia Dunstan, 1923, p. 38.

**Shepherdia quadrivittata* Dunst., 1923, p. 39.

Genus Polysitus Dunstan, 1923, p. 40.

**Polysitus punctatus* Dunst., 1923, p. 40.

Polysitus minutus Dunst., 1923, p. 42.

Family Tenebrionidae (?).

Genus Ulomites Till., 1916, p. 22.

**Ulomites willcoxi* Till., 1916, p. 22; Dunst., 1923, p. 43.

Family Elateridae (?).
  Genus ELATERIDIUM Till., 1918*a*, p. 751.
    Elateridium subulatum (Dunst.), 1923, p. 44.
    Elateridium transversum (Dunst.), 1923, p. 45.
  Genus ELATERIUM Westwood, 1854 (Quart. Journ. Geol. Soc., x., p. 387).
    Elaterium punctomarginum Dunst., 1923, p. 46.
    Elaterium bipunctatum Dunst., 1923, p. 47.

Family Dermestidae (?).
  Genus REEVEANA Dunstan, 1923, p. 48.
    **Reeveana major* Dunst., 1923, p. 48.
    Reeveana intermedia Dunst., 1923, p. 49.
    Reeveana minor Dunst., 1923, p. 50.
  Genus TRYONIOPSIS Dunstan, 1923, p. 51.
    **Tryoniopsis punctata* Dunst., 1923, p. 51.
    Tryoniopsis granulata Dunst., 1923, p. 52.

Family Buprestidae (?).
  Genus MESOSTIGMODERA Eth. & Oll., 1890, p. 10; Handl., 1906, p. 402.
    **Mesostigmodera typica* Eth. & Oll., 1890, p. 10; Handl., 1906, p. 402; Till., 1916, p. 22; Dunst., 1923, p. 56.
  Genus LOBITES Dunstan, 1923, p. 53.
    **Lobites tuberculata* Dunst., 1923, p. 54.
    Lobites trivittata Dunst., 1923, p. 53.
    Lobites granulata Dunst., 1923, p. 55.

Family Cerambycidae (?).
  Genus MESOTHORIS Till., 1916, p. 23.
    **Mesothoris clathrata* Till., 1916, p. 23; Dunst., 1923, p. 58.
    Mesothoris quadripartita Dunst., 1923, p. 60.
    Mesothoris tenuiclathrata Dunst., 1923, p. 61.
    Mesothoris grandis Dunst., 1923, p. 61.
  Genus WILLCOXIA Dunstan, 1923, p. 62.
    **Willcoxia magnopunctata* Dunst., 1923, p. 63.

Family Curculionidae (?).
  Genus ETHERIDGEA Handl., 1906, p. 402.
    **Etheridgea australis* Handl., 1906, p. 402; Till., 1916, p. 24; Dunst., 1923, p. 68.
  Genus TILLYARDIOPSIS Dunst., 1923, p. 64.
    **Tillyardiopsis tuberculata* Dunst., 1923, p. 65.
    Tillyardiopsis granulata Dunst., 1923, p. 66.
    Tillyardiopsis variotubercula Dunst., 1923, p. 67.

Family Dascillidae (?).
  Genus LEIOODES Dunstan, 1923, p. 68.
    **Leioodes plana* Dunst., 1923, p. 69.
    Leioodes pygmaea Dunst., 1923, p. 69.
  Genus APHELOODES Dunstan, 1923, p. 70.
    **Apheloodes obliqua* Dunst., 1923, p. 72.
    Apheloodes rugosa Dunst., 1923, p. 71.

Family Elateridae (?).
Genus ELATERIDIUM Till., 1918*a*, p. 751.
Elateridium subulatum (Dunst.), 1923, p. 44.
Elateridium transversum (Dunst.), 1923, p. 45.
Genus ELATERIUM Westwood, 1854 (Quart. Journ. Geol. Soc., x., p. 387).
Elaterium punctomarginum Dunst., 1923, p. 46.
Elaterium bipunctatum Dunst., 1923, p. 47.

Family Dermestidae (?).
Genus REEVEANA Dunstan, 1923, p. 48.
**Reeveana major* Dunst., 1923, p. 48.
Reeveana intermedia Dunst., 1923, p. 49.
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The composition of the above fauna is summarised in Table A.

Table A.

Table Showing the Numerical Composition of the Fauna.

Orders and Suborders.	Families.	Genera.	Species.	Percentage of Species.
Hemimetabolous Orders.				
Aeroplanoptera	1	1	1	0.8
Odonata	3	4	4	3.3
Protorthoptera	2	2	2	1.6
Orthoptera	4	6	12	9.8
{ Blattoidea	2	4	10	8.2
{ Mantoidea	1	1	1	0.8
{ Locustoidea	1	1	1	0.8
Hemiptera	8	19	34	27.9
{ Homoptera	6	15	27	22.2
{ Heteroptera	2	4	7	5.7
Holometabolous Orders.				
Protomecoptera	1	1	1	0.8
Mecoptera	2	2	2	1.6
Paratrichoptera	1	4	4	3.3
Neuroptera Planipennia	2	4	4	3.3
Coleoptera	8	20	58	47.6
Total (10 orders):—	32	63	122	100.0

Percentage of species of Hemimetabola:—43.4.
Percentage of species of Holometabola:—56.6.

The Geological Age of the Ipswich Beds.

The composition of the Insect Fauna of the Ipswich Fossil Beds affords very valuable evidence of the geological age of these beds. In order to make this evidence clear, I give below a Table (Table B.) comparing the percentages of the various Orders in the Ipswich Beds with those of the Belmont Beds, which are undoubtedly of Upper Permian Age, and the Liassic Beds of Europe. It will also be necessary to trace the evolution of certain test groups of insects to show how the percentage of such groups may be used as an aid in indicating the comparative ages of the beds.

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Table B.

Table showing the Ordinal Percentages in the Belmont, Ipswich and European Liassic Insect Faunas.

Orders and Suborders.	Belmont.	Ipswich.	Liassic of Europe.
Hemimetabolous Orders.			
Aeroplanoptera	—	0.8	—
Odonata	—	3.3	5.2
Protorthoptera	—	1.6	—
Orthoptera	—	9.8	26.5
Blattoidea	—	8.2	7.4
Mantoidea	—	0.8	2.5
Locustoidea	—	0.8	16.6
Hemiptera	47.4	27.9	9.6
Homoptera	47.4	22.2	7.4
Heteroptera	0.0	5.7	2.2
Holometabolous Orders.			
Neuroptera Planipennia	5.3	3.3	4.3
Protomecoptera	5.3	0.8	—
Mecoptera	21.0	1.6	4.6
Paramecoptera	10.5	—	—
Paratrichoptera	—	3.3	—
Diptera	—	—	4.0
Trichoptera	—	—	4.0
Coleoptera	10.5	47.6	41.8
	100.0	100.0	100.0
Percentage of Hemimetabola ..	47.4	43.4	41.3
Percentage of Holometabola .	52.6	56.6	58.7

N.B.—The above percentages are calculated on the following total numbers of species for each fauna:—Belmont, 19; Ipswich, 122; Lias, 324. The Lias includes both Lower and Upper Lias, together with some Rhaetic fossils, reckoned by Handlirsch as Lower Lias. The record of the European Triassic is too small and fragmentary to be of any use.

Referring to Table B., the following groups may be considered separately:—

(1). *Hemimetabola and Holometabola.* As is well known, the first winged insects were all Hemimetabolous, i.e., they did not possess a true pupal or resting stage. In the Upper Carboniferous, where the Insecta are first met with in the fossil state, the percentage of Hemimetabolous insects is 100.0, that of Holometabolous insects 0.0. The same holds good, apparently, for the Lower Permian of Europe. In studying some two thousand specimens recently sent to me from Yale University, taken from the Lower Permian of Kansas, I am able to recognise the oldest known Holometabolous insects in the form of some very small wings undoubtedly belonging to the Order Mecoptera; the percentage of these wings to the total is under 1 per cent. The first record that we have of the Holometabola being at all abundant is in the Upper Permian Beds of Belmont, N.S.W., where no less than ten out of the nineteen known species are Holometabolous, or 52.6 per cent. No doubt this percentage will be considerably altered when a larger number of wings have been taken from these beds; but the important point to be noted is that here, for the first time, we find the Holometabola firmly established, and approximately 50 per cent. of the total fauna.

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Locustoidea	—	0.8	16.6
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Paratrichoptera	—	3.3	—
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As we pass upwards through the various epochs to the present time, the percentage of Holometabola steadily increases, while that of the Hemimetabola just as steadily diminishes. In the European Lias, 58.7 of the fossils are Holometabola, only 41.3 Hemimetabola. For the whole of the Tertiary Insect Beds, the percentage of Holometabola is 80.0, that of the Hemimetabola 20.0. For Recent Pterygote Insects, the percentage of Holometabola is 87.8, that of Hemimetabola 12.2. Thus we see that the older (Hemimetabolous) groups have steadily lost ground, while the newer (Holometabolous) groups have just as steadily gained.

Applying this result to the Ipswich fauna, we find that the percentages of Holometabola and Hemimetabola there lie *between* those of Belmont on the one hand and the European Lias on the other, but proportionately closer to the Lias than to the Belmont horizon, in the ratio of almost exactly two to one. Thus the Ipswich Beds fall, on this percentage, within the Upper Trias. If we take into account the probability that, even at this early date, some archaic groups (e.g., Aeroplanoptera and Protorthoptera) had found refuge in Australia, but were extinct in Europe, we should expect that a slightly increased percentage of Hemimetabola might be looked for in an Australian fossil bed as compared with a European fossil bed of the same age. If it is permissible to make a small allowance for this, we should then have to bring the horizon of the Ipswich Beds slightly nearer still to the Lias, i.e., to the top of the Upper Trias.

(2). *Blattoidea.* The Cockroaches are the most ancient of existing insects, and were present in great numbers in the Upper Carboniferous. In some Upper Carboniferous Beds (e.g., those of England and Germany) they are so abundant as to account for more than 90 per cent. of the total insect fauna; but this, as Pruvost has pointed out, is only where the fossilised fauna was one inhabiting a locality exceptionally suitable for the existence of these insects. In other localities, as at Commentry and Mazon Creek, the percentage is much less (20 per cent. or lower), but still very considerable. In the Lower Permian we find the same thing; in some beds Cockroaches make up the majority of the fauna; in others, the percentage is much smaller. Not long after the disappearance of the Coal-measure forests, the Cockroaches began to die out very rapidly; and from the beginning of the Mesozoic to the present day they have been a decreasing group, their percentage to the total being 0.7 in the Tertiary, and only 0.4 in Recent times.

No cockroaches were present, as far as known, in the Belmont Beds, and we can only assume that the group had not been dispersed far enough to have reached Australia in Upper Permian times. Cockroaches are, however, present at Ipswich, and belong almost exclusively to that group, viz., the family Mesoblattinidae, which is typical of the European Lias. The exception to this is the single genus *Austromylacrites,* which is a remnant of an old Carboniferous group, quite extinct in the European Lias. If, then, we compare the Cockroaches of the Ipswich Beds with those of the European Lias, we find that the former has distinctly the higher percentage, 8.2, as against 7.4 for the Lias, and that it is morphologically slightly more archaic. Thus we can only conclude that, judged by the Cockroaches, the Ipswich Beds are somewhat older than the Lias, and are rightly considered as Upper Triassic.

(3). *Odonata.* The true Dragonflies or Odonata first arose in the Lower Permian, where a single species has recently been discovered by me from the Kansas Beds. Apart from Ipswich, no other records of the Order are to be found until we come to the European Lias, where they are represented by a number of

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Comparing the Odonata of the Ipswich Beds with those of the Liassic, we note that the percentage is distinctly less for Ipswich, viz., 3.3, as against 5.2 for the Lias (the latter will be greatly increased when the new species are taken into account). Not only so, but the forms discovered at Ipswich, though closely allied to some of the Liassic forms, are distinctly simpler in structure, and therefore more archaic. The genus *Triassolestes* from Ipswich has a petiolate wing-base without any signs of an anal area at all, and is the only known Odonate type, exclusive of the undescribed Lower Permian form, which possesses this exceedingly simple and archaic condition. As the evolution of the Order as a whole from exceedingly simple, petiolate types, of which our Australian genera *Hemiphlebia*, *Chorismagrion* and *Synlestes* are the nearest existing forms at the present day, has been clearly established, not only by the discovery in the Lower Permian of Kansas, but also by Dr. C. H. Kennedy's wonderful work on the penes of the males of Odonata, we may safely conclude that the Ipswich Odonate fauna belongs to a period not far from the Lias, but undoubtedly somewhat older. This evidence, then, would also point to an Upper Triassic age for the Ipswich Beds.

(4). *Evolution of the Trichoptera and Diptera.* In the Upper Permian of Belmont there occur two remarkable wings, *Belmontia** and *Parabelmontia*,† which I have shown to be allied to the true Mecoptera and almost certainly a portion of the original stock which gave origin to the three Orders Diptera, Trichoptera and Lepidoptera. *Belmontia*, which possesses the distal fork of Cu_1, indicates the condition of evolution at that time of the combined Trichoptero-Lepidopterous ancestral stock. *Parabelmontia*, which has a simple Cu_1, indicates the condition of the ancestors of the Diptera at that time. In the European Lias, no wings comparable to these two are to be found; but true Trichoptera appear in the Lower Lias, and true Diptera in the Upper Lias. Now if we turn to the Ipswich fauna, we find, on the one hand, no true Paramecoptera present, and on the other hand no true Trichoptera or Diptera present either. But there is present a group, which I have placed in a separate Order Paratrichoptera, in which the wings closely resemble those of archaic Trichoptera and Diptera, but differ from both of them in important points. They are not true Trichoptera, because they do not possess the apical fork of Cu_1, which all archaic Trichoptera possess. They are not true Diptera, because they have not yet undergone any reduction or narrowing-in of the basal part of the wing, and, therefore, by inference, they also still possessed well developed hindwings. These wings of the Order Paratrichoptera are, in fact, intermediate forms between the Upper Permian *Parabelmontia* and true Diptera. Hence we must conclude that the beds in which they are found lie between the Upper Lias, where true Diptera occur, and the Upper Permian, where *Parabelmontia* occurs. Also, since no true Trichoptera occur at Ipswich,

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† These Proceedings, xlvii., 1922, p. 284.

and such were fairly abundant in the Lower Lias, it is a fair conclusion to come to that these beds are not Lower Lias, but somewhat older. The same result is obtained if we consider the time it would take, in the course of evolution, for the Paratrichoptera to lose their hindwings and become true Diptera. If these wings were Lower Liassic, we should at any rate expect to see some more definite evidence of reduction of the base of the forewing, indicating the actual beginnings of the true Order Diptera. Morphologically, the wings of the Paratrichoptera are almost as close to those of *Parabelmontia* as they are to the forewings of Diptera, and this fact requires that we should place them at least as far back as the Upper Trias.

(5). *Coleoptera.* The first known fossil Coleoptera are a few small elytra recently found at Belmont, but not yet described. These elytra are closely similar to the majority of the elytra found at Ipswich, and can be definitely assigned to the Hydrophilidae. The percentage of Coleoptera in the Lias was just about 42; and this Order, the dominant one amongst the Insecta, has kept this percentage almost unchanged to the present day. At Ipswich, the percentage was 47.6. A simple explanation of this record percentage is to be found if we look at the percentages of the other Holometabolous Orders at Ipswich. No Diptera or Trichoptera had yet appeared on the scene, and the Mecoptera and Planipennia were not yet as abundant as they were in the Lias. It has been the uprising of these groups and, later on, of the Hymenoptera and Lepidoptera, which has kept the percentage of Coleoptera stationary, in spite of the great actual numerical increase of species within the Order. Hence we find, at Ipswich, a period represented when the Coleoptera, as the first of the highly successful Holometabolous Orders (for the older Mecoptera and Planipennia never became highly successful), reached its maximum percentage compared with other Orders. Such a period must of necessity have been somewhat earlier than the Lias, while the great disparity between the percentages of Coleoptera at Belmont (10.5 per cent.) and Ipswich (47.6 per cent.) would indicate that it was considerably removed from the Upper Permian. The evidence, then, would lead us to assign an Upper Triassic age for the Ipswich Beds.

(6). *Hemiptera.* This Order offers very convincing evidence of the age of the Ipswich Beds. Hemiptera first appear in the Upper Permian, both in Europe and at Belmont, and are in both cases represented by only the single Suborder Homoptera. The Order was at its maximum percentage at Belmont, chiefly because no other groups were present in sufficient numbers to compete with it, except only the Mecoptera. From that time onwards its comparative percentage decreased to the end of the Mesozoic, rising again to 12.3 in the Tertiary, and finally falling to 7.9 at the present day. At the same time, the Suborder Heteroptera, which was absent in the Upper Permian, has gradually gained on the Suborder Homoptera, until at the present day it accounts for 4.5 of the 7.9 per cent. for the whole Order, leaving only 3.4 for the Suborder Homoptera. In the European Lias, the percentage of Hemiptera to the whole Insect fauna is 9.6, made up of 7.4 Homoptera and 2.2 Heteroptera. Thus it will be seen that, in the Lias, the Homoptera were more abundant than the Heteroptera in the proportion of about 7 to 2, though at the present day the Heteroptera are the more abundant. At Ipswich, the percentage of Hemiptera to the total Insect fauna is 27.9, which is intermediate between the percentage for Belmont (47.4) and that for the European Lias (9.6), and somewhat nearer the latter than the former. Also, if we compare the proportions of Homoptera to Heteroptera, we find 22.2 per cent. of the former to 5.7 per cent. of the latter, or a proportion of about 4 to 1, i.e., the and such were fairly abundant in the Lower Lias, it is a fair conclusion to come to that these beds are not Lower Lias, but somewhat older. The same result is obtained if we consider the time it would take, in the course of evolution, for the Paratrichoptera to lose their hindwings and become true Diptera. If these wings were Lower Liassic, we should at any rate expect to see some more definite evidence of reduction of the base of the forewing, indicating the actual beginnings of the true Order Diptera. Morphologically, the wings of the Paratrichoptera are almost as close to those of *Parabelmontia* as they are to the forewings of Diptera, and this fact requires that we should place them at least as far back as the Upper Trias.

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Homoptera are a little more abundant proportionately than in the Lias. Expressed as percentages of the whole Order Hemiptera, we have the following results:—

Suborder.	Belmont.	Ipswich.	European Lias.	Recent.
Homoptera	100.0	79.6	77.1	43.0
Heteroptera	0.0	20.4	22.9	57.0

We see again from this result that the evidence offered by the percentage and composition of the Order Hemiptera at Ipswich is to the effect that the age of the Ipswich Beds is intermediate between the Upper Permian of Belmont and the European Lias, and definitely closer to the latter than to the former.

On all the above six counts, then, we come to the same conclusion, viz., that the Ipswich Beds are definitely older than the Lias, but not very much older. The same results would have been obtained if we had considered the whole of the Order Orthoptera, since we should then note, not only the relative decrease in the Cockroaches as we pass from Ipswich to the Lias, but also the relative increases in the two newer Suborders Mantoidea and Locustoidea. As the first known Locustoid occurs in the passage beds between Upper Permian and Lower Trias in the Balmain Colliery at Sydney, N.S.W.,* the relative increase of the Suborder Locustoidea is particularly striking; this Suborder is outstandingly the dominant group of Orthoptera at the present day.

The presence at Ipswich of archaic Orders (Aeroplanoptera, Protorthoptera, Protomecoptera) not found in the Lias or any later beds, also leads us to the same conclusion.

Making all due allowance for the possibility of an Australian Mesozoic Insect fauna being somewhat more archaic in composition than a European fauna of the same time (but not much, for it is clear that the Upper Permian Insect fauna of Belmont was, if anything, ahead of contemporary faunas in other parts of the world), the following would appear to be a fair conclusion as to the age of the Ipswich Insect Beds:—

The composition of the Insect Fauna of the Ipswich Beds indicates, both collectively and by analysis of its outstanding groups, that *the age of the Beds was not earlier than the lowest division of the Upper Triassic, and not later than the top of the Upper Triassic; it was most probably a little older than Rhaetic.*

* *Elcanopsis sydneiensis* Till., These Proceedings, xliii., 1918, p. 263.

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**Elcanopsis sydneiensis* Till., These Proceedings, xliii., 1918, p. 263.

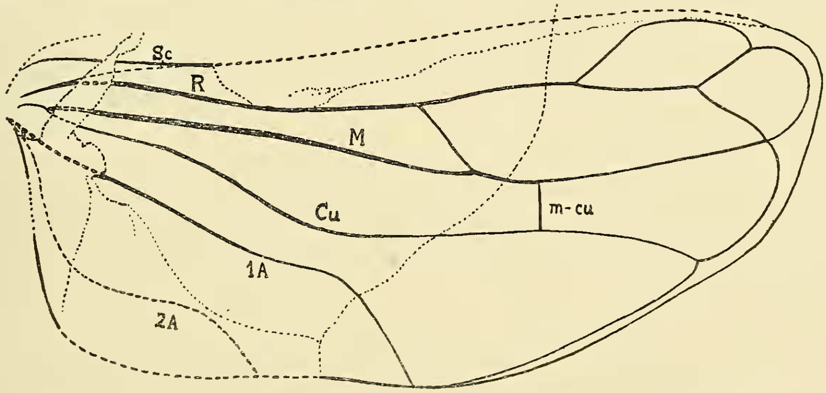
Appendix.

Order **HEMIPTERA.**
Suborder **Homoptera.**

Family IPSVICIIDAE.

IPSVICIA JONESI Till. (Plate xliii., fig. 38; Text-fig. 90).

Hindwing: *Total length* 10.5 mm.; *greatest breadth* 4.7 mm. A nearly complete impression, with most of the costal margin and about one-third of the posterior margin missing. Main veins stoutly built. R slightly waved, giving off at about half-way a descending oblique branch which meets M somewhat before the level of the medio-cubital cross-vein; further distad, R gives off an anterior oblique branch, and finally forks widely not far from apex; the ambient vein connects these last three branches of R in two loops, and continues posteriorly as a convex loop between the ends of M and Cu, and as a slightly convex loop between Cu and 1A; the ambient vein is throughout very close to the wing-margin. M nearly straight up to half-way, and then curving slightly upwards to meet the posterior distal fork of R at its apex. Medio-cubital cross-vein (*m-cu*) situated at about two-thirds. Cu considerably waved near middle concavely to costal border, unbranched. 1A a strong, simple vein strongly bent downwards in its distal third. 2A a shorter vein, strongly double-curved.



Text-fig. 90. *Ipsvicia jonesi* Till. Hindwing. (x 6.7). Missing portions restored by dotted lines. Drawing made from Specimens No. 285a and 340. 1A, 2A, first and second anal veins; Cu, cubitus; M, media; m-cu, medio-cubital cross-vein; R, radius; Sc, subcosta.

Heautotypes: Specimen No. 285*a* shows the hindwing as figured in Plate xliii., fig. 38 and Text-fig. 90; the whole of 2A as well as the dotted portions of the costal and posterior margins are missing in this specimen. Specimen No. 340*a* is an impression of all four wings of a large individual close together and partially overlying one another. A large portion of the base of one hindwing, lying clear of the tegmina, shows 2A and 1A complete, a considerable portion of M, and about the basal fourth of R and the costa; Sc can be seen as a short vein joining the costa not far from base. One tegmen is complete, measuring 13 mm. long; the other has only the apical portion preserved, and the second hindwing is folded under and between the two, so that only a small part of it can be seen.

Appendix.

Order **HEMIPTERA.**

Suborder **Homoptera.**

Family IPSVICIIDAE.

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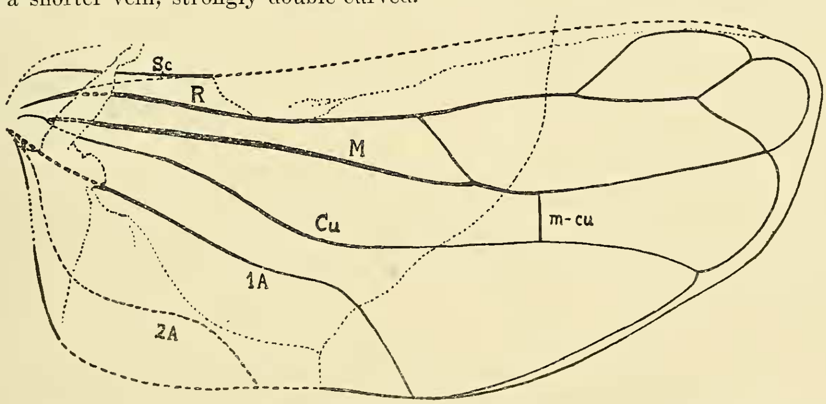

Text-fig. 90. *Ipsvicia jonesi* Till. Hindwing. (x 6.7). Missing portions restored by dotted lines. Drawing made from Specimens No. 285a and 340. 1A, 2A, first and second anal veins; Cu, cubitus; M, media; m-cu, medio-cubital cross-vein; R, radius; Sc, subcosta.

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This specimen affords the proof that the more complete hindwing represented by itself in Specimen No. 285 belongs to *Ipsvicia jonesi* Till.

Additional material of the tegmina of this species is found in Specimen No. 226, consisting of a complete tegmen, 13 mm. long, only moderately well preserved, together with a small fragment of the base of a second tegmen lying close beside it; 17 mm. away from these, on the same piece of rock, lies another almost complete tegmen, moderately well preserved. All the above are in Coll. Queensland Geol. Survey, Brisbane, Q.

Horizon.—Upper Triassic, Ipswich, Q.

The discovery of the hindwing of the genus *Ipsvicia* is of great interest, because of the simplicity of the venation, in which M is unbranched, and the primitive condition of the ambient vein, lying very close to the border of the wing. These characters can now be added to the definition of the family Ipsviciidae, which would appear to be well established on the combined characters of the tegmen and hindwing.

Suborder **Heteroptera.**

Family TRIASSOCORIDAE.

Triassocoris myersi Tillyard.

Specimen No. 150*a-b* appears to represent the body of this species, with the exception of the head and pronotum, which are missing. The scutellum is broad and triangular; the shape of the body broadly oval. There are signs of the segmentation of the first two abdominal segments only. *Total length* of specimen, 5.1 mm., *greatest breadth* 4.4 mm.

Triassocoris scutulum Tillyard.

Specimen No. 179*a-b* appears to represent the body of this species, with the exception of the head and pronotum, which are missing. The scutellum is subtriangular, less wide than in *T. myersi;* the shape of the abdomen is somewhat narrower, and somewhat pointed apically. *Total length* of specimen, 5 mm., *greatest breadth* 3 mm.

Triassocoris ovalis, n.sp. (Text-fig. 91).

This is also an impression of the whole body with the exception of head and pronotum; in addition, the hemelytra can be faintly made out. The scutellum is triangular, not so wide as in *T. myersi;* the abdomen is broadly oval, even more rounded apically than in *T. myersi;* the hemelytra appear to be slightly granulose and also slightly and delicately striated distally. There is also what appears to be an impression of portion of the left fore-leg. *Total length* of specimen, 4.8 mm., *greatest breadth* 3.6 mm.

Type, Specimen No. 129*a,* in Coll. Queensland Geol. Survey, Brisbane.

Horizon.—Upper Triassic, Ipswich, Q.

This specimen affords the proof that the more complete hindwing represented by itself in Specimen No. 285 belongs to *Ipsvicia jonesi* Till.

Additional material of the tegmina of this species is found in Specimen No. 226, consisting of a complete tegmen, 13 mm. long, only moderately well preserved, together with a small fragment of the base of a second tegmen lying close beside it; 17 mm. away from these, on the same piece of rock, lies another almost complete tegmen, moderately well preserved. All the above are in Coll. Queensland Geol. Survey, Brisbane, Q.

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The discovery of the hindwing of the genus *Ipsvicia* is of great interest, because of the simplicity of the venation, in which M is unbranched, and the primitive condition of the ambient vein, lying very close to the border of the wing. These characters can now be added to the definition of the family Ipsviciidae, which would appear to be well established on the combined characters of the tegmen and hindwing.

Suborder **Heteroptera.**

Family TRIASSOCORIDAE.

TRIASSOCORIS MYERSI Tillyard.

Specimen No. 150*a-b* appears to represent the body of this species, with the exception of the head and pronotum, which are missing. The scutellum is broad and triangular; the shape of the body broadly oval. There are signs of the segmentation of the first two abdominal segments only. *Total length* of specimen, 5.1 mm., *greatest breadth* 4.4 mm.

TRIASSOCORIS SCUTULUM Tillyard.

Specimen No. 179*a-b* appears to represent the body of this species, with the exception of the head and pronotum, which are missing. The scutellum is subtriangular, less wide than in *T. myersi;* the shape of the abdomen is somewhat narrower, and somewhat pointed apically. *Total length* of specimen, 5 mm., *greatest breadth* 3 mm.

TRIASSOCORIS OVALIS, n.sp. (Text-fig. 91).

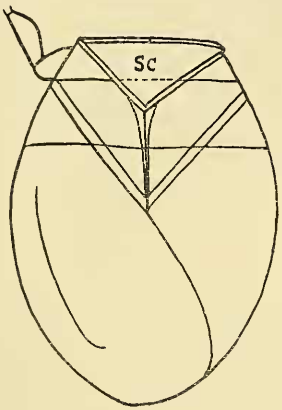
This is also an impression of the whole body with the exception of head and pronotum; in addition, the hemelytra can be faintly made out. The scutellum is triangular, not so wide as in *T. myersi;* the abdomen is broadly oval, even more rounded apically than in *T. myersi;* the hemelytra appear to be slightly granulose and also slightly and delicately striated distally. There is also what appears to be an impression of portion of the left fore-leg. *Total length* of specimen, 4.8 mm., *greatest breadth* 3.6 mm.

Type, Specimen No. 129*a,* in Coll. Queensland Geol. Survey, Brisbane.

Horizon.—Upper Triassic, Ipswich, Q.

TRIASSOCORIS GRANDIS, n.sp. (Text-fig. 92).

This specimen shows the same parts of the body as the three preceding, but is considerably larger; it is remarkable in that the wings were either missing or too faintly impressed to be made out with certainty, whereas on the other hand the segmentation of the abdomen is clearly marked, so that it can be seen that the



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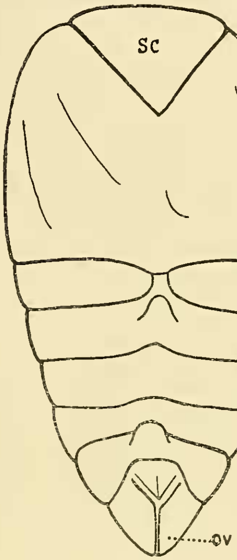


92.

Text-fig. 91. *Triassocoris ovalis*, n.sp. Body with hemelytra and part of left foreleg. (x 6.7). Drawn from Specimen No. 129a. sc, scutellum.
Text-fig. 92. *Triassocoris (?) grandis*, n.sp. Body (x 6.7). Drawn from Specimen No. 196a. ov, ovipositor; sc, scutellum.

specimen was a female. The scutellum is sub-triangular, rather small for the size of the insect, and comparatively narrow. In the abdomen, which is subtriangular and well pointed apically, six segments can be clearly made out, together with a terminal ovipositor. *Total length* of specimen 7.3 mm., *greatest breadth* 3.9 mm.

Type, Specimen No. 196*a* in Coll. Queensland Geol. Survey.
Horizon.—Upper Triassic, Ipswich, Q.

Order **NEUROPTERA**.

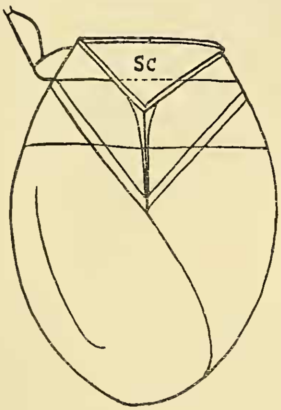
Suborder **Planipennia**.

Family PROHEMEROBIIDAE.

This family is characterised by a general similarity to the recent Psychopsidae, but is less specialised in lacking the strong *vena triplica* formation found in that family, and in having the wings less rounded apically, with the costal space not so broadly expanded. A single genus and species, *Protopsychopsis venosa* Till., has already been described from Ipswich.

TRIASSOCORIS GRANDIS, n.sp. (Text-fig. 92).

This specimen shows the same parts of the body as the three preceding, but is considerably larger; it is remarkable in that the wings were either missing or too faintly impressed to be made out with certainty, whereas on the other hand the segmentation of the abdomen is clearly marked, so that it can be seen that the specimen was a female. The scutellum is sub-triangular, rather small for the size of the insect, and comparatively narrow. In the abdomen, which is sub-triangular and well pointed apically, six segments can be clearly made out, together with a terminal ovipositor. *Total length* of specimen 7.3 mm., *greatest breadth* 3.9 mm.



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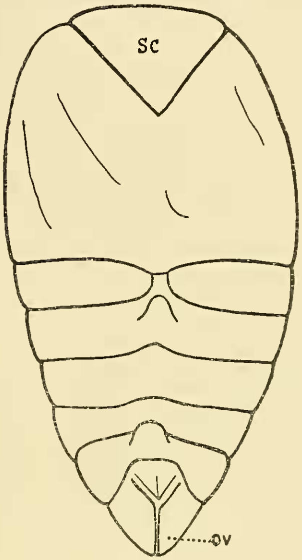

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Text-fig. 91. *Triassocoris ovalis*, n.sp. Body with hemelytra and part of left foreleg. (x 6.7). Drawn from Specimen No. 129a. sc, scutellum.
Text-fig. 92. *Triassocoris (?) grandis*, n.sp. Body (x 6.7). Drawn from Specimen No. 196a. ov, ovipositor; sc, scutellum.

Type, Specimen No. 196*a* in Coll. Queensland Geol. Survey.

Horizon.—Upper Triassic, Ipswich, Q.

Order **NEUROPTERA.**

Suborder **Planipennia.**

Family PROHEMEROBIIDAE.

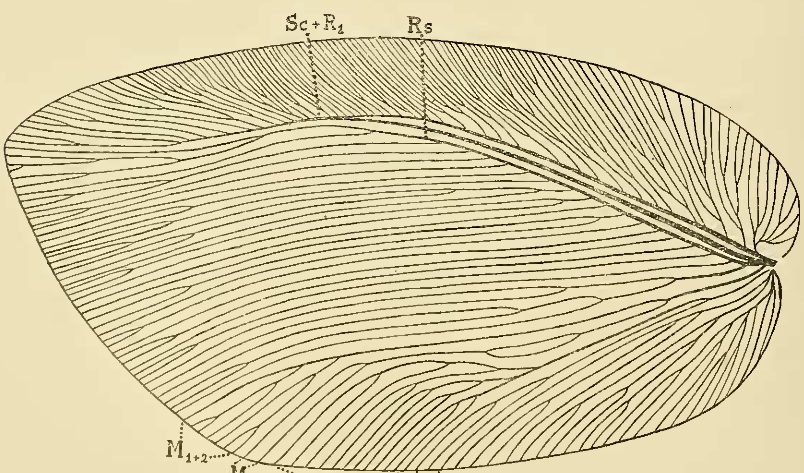
This family is characterised by a general similarity to the recent Psychopsidae, but is less specialised in lacking the strong *vena triplica* formation found in that family, and in having the wings less rounded apically, with the costal space not so broadly expanded. A single genus and species, *Protopsychopsis venosa* Till., has already been described from Ipswich.

Genus OSMYLOPSYCHOPS, n.g. (Plate xliii., figs. 39, 40; Text-fig. 93).

Costal area of moderate breadth basally, diminishing towards apex. Costal veinlets arising from Sc close to base at an angle of about 45°, but this angle rapidly diminishes further from the base, and for most of the wing-length is about 25° to 20°; these veinlets very numerous and close together, many of them forked, but there are no clear signs of any connecting cross-bars. Sc straight for most of its length, then arching somewhat downwards and fusing at a slight angle with R_1 (as in recent Osmylidae). R_1 a strong vein, straight for most of its length, but somewhat curved downwards after fusing with Sc. Rs running close below R_1, but neither fused nor connected with it in any manner. Branches of Rs numerous, about twenty, closely parallel, some forked near bases, most of them with small distal forks. These sectors arise from Rs at an angle varying from 35° to 30° only. M forked near base, the two branches running closely parallel to one another and to the branches of Rs just above them. Cu forked near base Cu_2 running close below Cu_1 for most of its length; some little way from the posterior border of the wing, Cu_1 arches away from Cu_2 and branches into several forked veins which occupy the triangular space between M_{3+4} and Cu_2. Anal veins with numerous branches.

Genotype, *Osmylopsychops spillerae*, n.sp. (Upper Trias of Ipswich, Q.).

This genus is undoubtedly a true Prohemerobiid on account of the general structure of the venation and the primitive condition of the three veins Sc, R_1 and Rs, which do not form a true *vena triplica;* but it is remarkable in having Sc fused with R_1 in the manner of recent Osmylidae. This character is indicated in the generic name. The distal branching of Cu_1 is also peculiar and indicates, perhaps, some connection with the Berothidae. The small angle at which the branches of Rs arise is also noteworthy, and will serve to distinguish this genus at a glance from the other Triassic Planipennia.



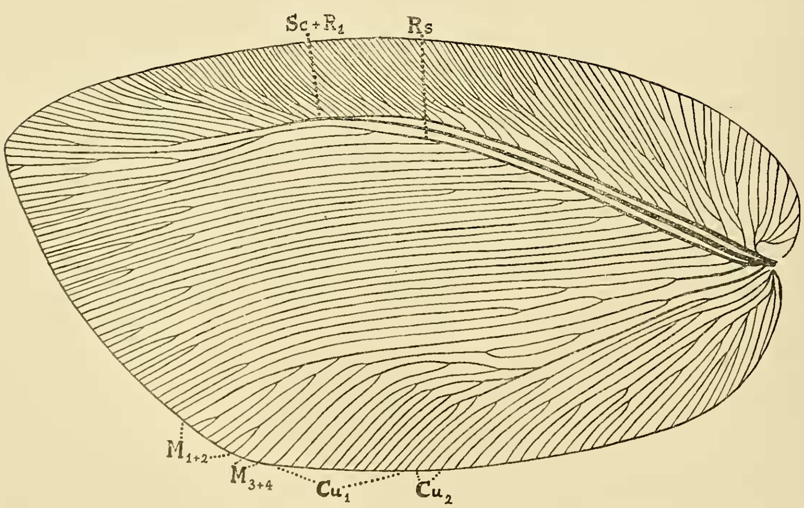
Text-fig. 93. *Osmylopsychops spillerae*, n.g. et sp. Restoration of forewing (x 2.5). Cu_1, Cu_2, first and second branches of cubitus; M_{1+2}, M_{3+4} branches of media; Rs, radial sector; Sc+R_1, fused subcosta and radius.

Genus OSMYLOPSYCHOPS, n.g. (Plate xliii., figs. 39, 40; Text-fig. 93).

Costal area of moderate breadth basally, diminishing towards apex. Costal veinlets arising from Sc close to base at an angle of about 45°, but this angle rapidly diminishes further from the base, and for most of the wing-length is about 25° to 20°; these veinlets very numerous and close together, many of them forked, but there are no clear signs of any connecting cross-bars. Sc straight for most of its length, then arching somewhat downwards and fusing at a slight angle with R_1 (as in recent Osmylidae). R_1 a strong vein, straight for most of its length, but somewhat curved downwards after fusing with Sc. Rs running close below R_1, but neither fused nor connected with it in any manner. Branches of Rs numerous, about twenty, closely parallel, some forked near bases, most of them with small distal forks. These sectors arise from Rs at an angle varying from 35° to 30° only. M forked near base, the two branches running closely parallel to one another and to the branches of Rs just above them. Cu forked near base Cu_2 running close below Cu_1 for most of its length; some little way from the posterior border of the wing, Cu_1 arches away from Cu_2 and branches into several forked veins which occupy the triangular space between M_{3+4} and Cu_2. Anal veins with numerous branches.

Genotype, *Osmylopsychops spillerae*, n.sp. (Upper Trias of Ipswich, Q.).

This genus is undoubtedly a true Prohemerobiid on account of the general structure of the venation and the primitive condition of the three veins Sc, R_1 and Rs, which do not form a true *vena triplica;* but it is remarkable in having Sc fused with R_1 in the manner of recent Osmylidae. This character is indicated in the generic name. The distal branching of Cu_1 is also peculiar and indicates, perhaps, some connection with the Berothidae. The small angle at which the branches of Rs arise is also noteworthy, and will serve to distinguish this genus at a glance from the other Triassic Planipennia.



Text-fig. 93. *Osmylopsychops spillerae*, n.g. et sp. Restoration of forewing (x 2.5). Cu_1, Cu_2, first and second branches of cubitus; M_{1+2}, M_{3+4} branches of media; Rs, radial sector; Sc+R_1, fused subcosta and radius.

OSMYLOPSYCHOPS SPILLERAE, n.sp. (Plate xliii., figs. 39, 40; Text-fig. 93).

This species is represented by two fairly large wing-fragments; both probably belong to the forewing, but not to the same individual.

*Specimen No. 314*a has a total length of 14 mm., and shows most of the basal portion (the costal and posterior margins indistinct), with a distance of about 5 mm. along the three main veins Sc, R_1 and Rs. Beyond this there is a gap; but, below that gap, a series of no less than thirteen sectors of Rs are preserved completely to the somewhat broken wing-margin; below these again are the complete M and Cu and basally, all except the extreme bases of the anal veins are preserved. A noteworthy feature of M_{3+4} is the presence of an elongate oval closed cell about the middle of its length; this cell indicates the division and re-fusion of M_3 and M_4, and is to be found in a number of recent Psychopsidae. It is most probably a specific character, but may have been only an individual one. The apical expansion and forkings of Cu_1 are well shown in this specimen.

*Specimen No. 283*a has a length of 12.5 mm. and shows a large portion of the wing with the exception of the basal third, the extreme apical piece, and the margins of the wing; there is also a large gap in the distal portions of a number of the branches of Rs. The distal forkings of Cu_1, and the course of Cu_2 in a deep furrow just below it, are absent except for a small portion; but this portion is just sufficient to allow of this fragment being placed in position upon the previous fragment, when it will be seen that the two practically coincide with respect to every vein common to the two, so that they evidently belong to the same species. This fragment shows very clearly the fusion of Sc with R_1, and the manner in which Rs remains unconnected with R_1 throughout, though running closely below it.

Type, Specimens No. 314*a* (holotype) and No. 283*a* (heautotype) in Coll. Queensland Geol. Survey, Brisbane.

Horizon.—Upper Triassic of Ipswich, Q.

The species is dedicated to Miss S. M. Spiller, of the Geological Survey, Brisbane. The complete forewing is shown restored in Text-fig. 93.

List of works referred to.

DUNSTAN, B., 1916.—Mesozoic and Tertiary Insects of Queensland and New South Wales. Stratigraphical Features. *Qland. Geol. Survey,* Publ. No. 253, pp. 1-10.

————, 1923.—Mesozoic Insects of Queensland. Part I. Introduction and Coleoptera. *Qland. Geol. Survey,* Publ. No. 273, pp. 1-88.

ETHERIDGE and OLLIFF, 1890.—Mesozoic and Tertiary Insects of N.S.W. (and Qland). *Mem. Geol. Survey N.S.W.,* Palaeontology No. 7, Sydney.

HANDLIRSCH, A., 1906.—Die Fossilen Insekten, etc. Absch. III. Mesozoische Insekten.

TILLYARD, R. J., 1916.—Mesozoic and Tertiary Insects of Queensland and New South Wales. Descriptions of the Fossil Insects. *Qland. Geol. Survey,* Publ. No. 253, pp. 11-47.

————, 1917.—Mesozoic Insects of Queensland. No. 1. Planipennia, Trichoptera and the new Order Protomecoptera. *Proc. Linn. Soc. N.S.W.* xlii., pt. 1, pp. 175-200.

————, 1918*a*.—Permian and Triassic Insects from New South Wales, in the Collection of Mr. John Mitchell. *Id.,* xlii., pt. 4, pp. 720-756.

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Type, Specimens No. 314*a* (holotype) and No. 283*a* (heautotype) in Coll. Queensland Geol. Survey, Brisbane.

Horizon.—Upper Triassic of Ipswich, Q.

The species is dedicated to Miss S. M. Spiller, of the Geological Survey, Brisbane. The complete forewing is shown restored in Text-fig. 93.

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————, 1923.—Mesozoic Insects of Queensland. Part I. Introduction and Coleoptera. *Qland. Geol. Survey*, Publ. No. 273, pp. 1-88.

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————, 1918*b*.—Mesozoic Insects of Queensland. No. 3. Odonata and Protodonata. *Id.*, xliii., pt. 3, pp. 417-436.

————, 1918*c*.————. No. 4. Hemiptera Heteroptera: the Family Dunstaniidae. With a Note on the Origin of the Heteroptera. *Id.*, xliii., pt. 3, pp. 568-592.

————. 1919*a*.————. No. 5. Mecoptera, the new Order Paratrichoptera, and additions to Planipennia. *Id.*, xliv., pt. 1, pp. 194-212.

————, 1919*b*.————. No. 6. Blattoidea. *Id.*, xliv., pt. 2, pp. 358-382.

————, 1920.————. No. 7. Hemiptera Homoptera; with a Note on the Phylogeny of the Suborder. *Id.*, xliv., pt. 4, (1920), pp. 857-896.

————. 1921.————. No. 8. Hemiptera Homoptera (contd.). The Genus *Mesogereon*; with a Discussion of its Relationship with the Jurassic Palaeontinidae. *Id.*, xlvi., pt. 2, pp. 270-284.

————, 1922.—Mesozoic Insects of Queensland. No. 9. Orthoptera, and Additions to the Protorthoptera, Odonata, Hemiptera and Planipennia. *Id.*, xlvii., pt. 4, pp. 447-470.

EXPLANATION OF PLATE XLIII.

Fig. 38. *Ipsvicia jonesi* Till. Hindwing. (x 6¼). Specimen No. 285a.

Fig. 39. *Osmylopsychops spillerae*, n.g. et sp. Fragment of wing. (x 5.6). Specimen No. 314a. Holotype.

Fig. 40. *Osmylopsychops spillerae*, n.g. et sp. (x 6). Specimen No. 283a. Heautotype.

Corrigendum.

On page 482 insert the heading, *Sub-order Zygoptera.*, above Family Triassolestidae (line 12).

————, 1918*b*.—Mesozoic Insects of Queensland. No. 3. Odonata and Protodonata. *Id.*, xliii., pt. 3, pp. 417-436.

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